Appendix To:

Wealth and Health Behavior: Testing the Concept of a Health Cost

By: Hans van Kippersluis and Titus J. Galama

A First-order conditions

Associated with the Hamiltonian (equation 4) we have the following conditions:

$$\begin{aligned}
\dot{q}_A(t) &= -\frac{\partial \Im(t)}{\partial A(t)} \Rightarrow \\
\dot{q}_A(t) &= -\delta q_A(t) \Leftrightarrow \\
q_A(t) &= q_A(0)e^{-\delta t}, \qquad (20)
\end{aligned}$$

$$\begin{aligned}
\dot{q}_H(t) &= -\frac{\partial \Im(t)}{\partial H(t)} \Rightarrow \\
\dot{q}_H(t) &= q_H(t)\frac{\partial d}{\partial H} - \frac{\partial U(t)}{\partial H(t)}e^{-\beta t} - q_A(0)\frac{\partial Y(t)}{\partial H(t)}e^{-\delta t} \qquad (21) \\
\frac{\partial \Im(t)}{\partial I(t)} &= 0 \Rightarrow \\
q_H(t) &= q_A(t)\left\{\frac{p_I(t)I(t)^{1-\alpha}}{\alpha\mu_I(t)}\right\} \\
&\equiv q_A(t)\pi_I(t), \qquad (22) \\
\frac{\partial \Im(t)}{\partial C_h(t)} &= 0 \Rightarrow \\
\frac{\partial U(t)}{\partial C_h(t)} &= q_A(0)p_{C_h}(t)e^{(\beta-\delta)t} + q_H(t)\frac{\partial d(t)}{\partial C_h(t)}e^{\beta t} \qquad (23)
\end{aligned}$$

$$\begin{aligned}
\frac{\partial \Im(t)}{\partial C_u(t)} &= 0 \Rightarrow \\
\frac{\partial U(t)}{\partial C_u(t)} &= q_A(0)p_{C_u}(t)e^{(\beta-\delta)t} + q_H(t)\frac{\partial d(t)}{\partial C_u(t)}e^{\beta t} \qquad (24)
\end{aligned}$$

Equation (23) provides the first-order condition for healthy consumption (equation 8). Similarly, equation (24) provides the first-order condition for unhealthy consumption (equation 11). Equation (22) is the first-order condition for investment in health (equation 5). Finally, using equation (21) we find the co-state equation for the relative value of health $q_{h/a}(t)$ (6).

B Comparative Dynamics

We are interested in the comparative dynamic effect of an increase in initial wealth A_0 on the control variables healthy consumption and unhealthy consumption. We start by taking the derivative of the first-order conditions with respect to initial wealth.

For the control variable healthy consumption the comparative dynamic effect of initial wealth A_0 is obtained from (8):

$$\begin{aligned}
& \left[\frac{\partial^2 U}{\partial C_h^2} - q_H(t)\frac{\partial^2 d}{\partial C_h^2}e^{\beta t}\right]\frac{\partial C_h}{\partial A_0} \\
= \quad & \left[\frac{1}{q_A(0)}\frac{\partial U}{\partial C_h}\right] \times \frac{\partial q_A(0)}{\partial A_0} \\
+ \quad & \left[q_A(0)\frac{\partial d}{\partial C_h}e^{(\beta-\delta)t}\right] \times \frac{\partial q_{h/a}}{\partial A_0} \\
+ \quad & \left[q_H(t)\frac{\partial^2 d}{\partial C_u \partial C_h}e^{\beta t} - \frac{\partial^2 U}{\partial C_u \partial C_h}\right] \times \frac{\partial C_u}{\partial A_0} \\
+ \quad & \left[q_H(t)\frac{\partial^2 d}{\partial H \partial C_h}e^{\beta t} - \frac{\partial^2 U}{\partial H \partial C_h}\right] \times \frac{\partial H}{\partial A_0}.
\end{aligned} \tag{25}$$

Or,

$$\frac{\partial C_h}{\partial A_0} \equiv b_q(t)\frac{\partial q_A(0)}{\partial A_0} + b_{h/a}(t)\frac{\partial q_{h/a}}{\partial A_0} + b_{C_u}(t)\frac{\partial C_u}{\partial A_0} + b_H(t)\frac{\partial H}{\partial A_0}, \tag{26}$$

where the coefficients $b_i(t)$ are defined by the transition from (25) to (26).

And, likewise, for unhealthy consumption the comparative dynamic effect of initial wealth is obtained from (11):

$$\begin{aligned}
& \left[\frac{\partial^2 U}{\partial C_u^2} - q_H(t)\frac{\partial^2 d}{\partial C_u^2}e^{\beta t}\right]\frac{\partial C_u}{\partial A_0} \\
= \quad & \left[\frac{1}{q_A(0)}\frac{\partial U}{\partial C_u}\right] \times \frac{\partial q_A(0)}{\partial A_0} \\
+ \quad & \left[q_A(0)\frac{\partial d}{\partial C_u}e^{(\beta-\delta)t}\right] \times \frac{\partial q_{h/a}}{\partial A_0} \\
+ \quad & \left[q_H(t)\frac{\partial^2 d}{\partial C_h \partial C_u}e^{\beta t} - \frac{\partial^2 U}{\partial C_h \partial C_u}\right] \times \frac{\partial C_h}{\partial A_0} \\
+ \quad & \left[q_H(t)\frac{\partial^2 d}{\partial H \partial C_u}e^{\beta t} - \frac{\partial^2 U}{\partial H \partial C_u}\right] \times \frac{\partial H}{\partial A_0}.
\end{aligned} \tag{27}$$

Or,

$$\frac{\partial C_u}{\partial A_0} \equiv c_q(t)\frac{\partial q_A(0)}{\partial A_0} + c_{h/a}(t)\frac{\partial q_{h/a}}{\partial A_0} + c_{C_h}(t)\frac{\partial C_h}{\partial A_0} + c_H(t)\frac{\partial H}{\partial A_0} \tag{28}$$

where the coefficients $c_i(t)$ are defined by the transition from (27) to (28).

Now substitute (26) into (28) and vice versa to obtain

$$\begin{aligned}\frac{\partial C_h}{\partial A_0} &= \frac{b_q(t)+b_{C_u}(t)c_q(t)}{1-c_{C_h}(t)b_{C_u}(t)} \times \frac{\partial q_A(0)}{\partial A_0} \\ &+ \frac{b_{h/a}(t)+b_{C_u}(t)c_{h/a}(t)}{1-c_{C_h}(t)b_{C_u}(t)} \times \frac{\partial q_{h/a}}{\partial A_0} \\ &+ \frac{b_H(t)+b_{C_u}(t)c_H(t)}{1-c_{C_h}(t)b_{C_u}(t)} \times \frac{\partial H}{\partial A_0}, \end{aligned} \tag{29}$$

and

$$\begin{aligned}\frac{\partial C_u}{\partial A_0} &= \frac{c_q(t)+c_{C_h}(t)b_q(t)}{1-c_{C_h}(t)b_{C_u}(t)} \times \frac{\partial q_A(0)}{\partial A_0} \\ &+ \frac{c_{h/a}(t)+c_{C_h}(t)b_{h/a}(t)}{1-c_{C_h}(t)b_{C_u}(t)} \times \frac{\partial q_{h/a}}{\partial A_0} \\ &+ \frac{c_H(t)+c_{C_h}(t)b_H(t)}{1-c_{C_h}(t)b_{C_u}(t)} \times \frac{\partial H}{\partial A_0}. \end{aligned} \tag{30}$$

Equations (29) and (30) show that the effect of variation in initial wealth A_0 can be decomposed into its effect on (i) lifetime wealth, $q_A(0)$, (ii) the relative value of health, $q_{h/a}(t)$, and (iii) health, $H(t)$. We assume diminishing returns to wealth, i.e. poor individuals derive greater marginal life-time utility benefits from an additional increment of wealth than wealthier individuals: $\partial q_A(0)/\partial A_0 < 0$ (a standard assumption made in the literature). The signs of $\partial q_{h/a}(t)/\partial A_0$ and of $\partial H(t)/\partial A_0$ in (29) and (30) are not known a priori, and we will explore them further below.

For the relative value of health, a co-state variable, the comparative dynamic effect of initial wealth A_0 is obtained from (6):

$$\begin{aligned}\frac{\partial}{\partial t}\frac{\partial q_{h/a}}{\partial A_0} &= \left[\frac{1}{q_A(0)^2}\frac{\partial U}{\partial H}e^{-(\beta-\delta)t}\right] \times \frac{\partial q_A(0)}{\partial A_0} \\ &+ \left[\frac{\partial d}{\partial H}+\delta\right] \times \frac{\partial q_{h/a}}{\partial A_0} \\ &+ \left[q_{h/a}(t)\frac{\partial^2 d}{\partial H \partial C_h} - \frac{1}{q_A(0)}\frac{\partial^2 U}{\partial C_h \partial H}e^{-(\beta-\delta)t}\right] \times \frac{\partial C_h}{\partial A_0} \\ &+ \left[q_{h/a}(t)\frac{\partial^2 d}{\partial H \partial C_u} - \frac{1}{q_A(0)}\frac{\partial^2 U}{\partial C_u \partial H}e^{-(\beta-\delta)t}\right] \times \frac{\partial C_u}{\partial A_0} \\ &+ \left[q_{h/a}(t)\frac{\partial^2 d}{\partial H^2} - \frac{1}{q_A(0)}\frac{\partial^2 U}{\partial H^2}e^{-(\beta-\delta)t} - \frac{\partial^2 Y}{\partial H^2}\right] \times \frac{\partial H}{\partial A_0}. \end{aligned} \tag{31}$$

Or,

$$\frac{\partial}{\partial t}\frac{\partial q_{h/a}}{\partial A_0} \equiv a_q(t)\frac{\partial q_A(0)}{\partial A_0} + a_{h/a}(t)\frac{\partial q_{h/a}}{\partial A_0} + a_{C_h}(t)\frac{\partial C_h}{\partial A_0} + a_{C_u}(t)\frac{\partial C_u}{\partial A_0} + a_H(t)\frac{\partial H}{\partial A_0}, \tag{32}$$

where the coefficients $a_i(t)$ are defined by the transition from (31) to (32).

Substituting (29) and (30) into (32), and omitting time arguments for the sake of brevity, we arrive at

$$\begin{aligned}
&\frac{\partial}{\partial t}\frac{\partial q_{h/a}}{\partial A_0} \\
= \;& \left\{ a_q + \frac{a_{C_h}\left[b_q + b_{C_u}c_q\right]}{1-c_{C_h}b_{C_u}} + \frac{a_{C_u}\left[c_q + c_{C_h}b_q\right]}{1-c_{C_h}b_{C_u}} \right\} \times \frac{\partial q_A(0)}{\partial A_0} \\
+ \;& \left\{ a_{h/a} + \frac{a_{C_h}\left[b_{h/a} + b_{C_u}c_{h/a}\right]}{1-c_{C_h}b_{C_u}} + \frac{a_{C_u}\left[c_{h/a} + c_{C_h}b_{h/a}\right]}{1-c_{C_h}b_{C_u}} \right\} \times \frac{\partial q_{h/a}}{\partial A_0} \\
+ \;& \left\{ a_H + \frac{a_{C_h}\left[b_H + b_{C_u}c_H\right]}{1-c_{C_h}b_{C_u}} + \frac{a_{C_u}\left[c_H + c_{C_h}b_H\right]}{1-c_{C_h}b_{C_u}} \right\} \times \frac{\partial H}{\partial A_0}.
\end{aligned} \tag{33}$$

The dynamic equation for health (2) can be rewritten in terms of $q_{h/a}(t)$ using (5) and (7) as follows:

$$\begin{aligned}
\frac{\partial H}{\partial t} &= I(t)^{\alpha} - d(t) \\
&= \left(\frac{\alpha \mu_I(t) q_{h/a}(t)}{p_I(t)}\right)^{\frac{\alpha}{1-\alpha}} - d[C_h(t), C_u(t), H(t)].
\end{aligned} \tag{34}$$

Taking the derivative with respect to A_0, it follows that

$$\begin{aligned}
\frac{\partial}{\partial t}\frac{\partial H}{\partial A_0} &= \frac{\alpha}{1-\alpha}\left(\frac{\alpha \mu_I(t)}{p_I(t)}\right)^{\frac{\alpha}{1-\alpha}} q_{h/a}(t)^{\frac{2\alpha-1}{1-\alpha}} \times \frac{\partial q_{h/a}}{\partial A_0} \\
&- \frac{\partial d}{\partial C_h} \times \frac{\partial C_h}{\partial A_0} \\
&- \frac{\partial d}{\partial C_u} \times \frac{\partial C_u}{\partial A_0} \\
&- \frac{\partial d}{\partial H} \times \frac{\partial H}{\partial A_0}.
\end{aligned} \tag{35}$$

Or,

$$\frac{\partial}{\partial t}\frac{\partial H}{\partial A_0} \equiv d_{h/a}(t)\frac{\partial q_{h/a}}{\partial A_0} + d_{C_h}(t)\frac{\partial C_h}{\partial A_0} + d_{C_u}(t)\frac{\partial C_u}{\partial A_0} + d_H(t)\frac{\partial H}{\partial A_0}. \tag{36}$$

Substitute (29) and (30) into (36) to obtain (again omitting time arguments for the sake of brevity)

$$\begin{aligned}
&\frac{\partial}{\partial t}\frac{\partial H}{\partial A_0} \\
= \;& \left\{ \frac{d_{C_h}\left[b_q + b_{C_u}c_q\right]}{1-c_{C_h}b_{C_u}} + \frac{d_{C_u}\left[c_q + c_{C_h}b_q\right]}{1-c_{C_h}b_{C_u}} \right\} \times \frac{\partial q_A(0)}{\partial A_0} \\
+ \;& \left\{ d_{h/a} + \frac{d_{C_h}\left[b_{h/a} + b_{C_u}c_{h/a}\right]}{1-c_{C_h}b_{C_u}} + \frac{d_{C_u}\left[c_{h/a} + c_{C_h}b_{h/a}\right]}{1-c_{C_h}b_{C_u}} \right\} \times \frac{\partial q_{h/a}}{\partial A_0}
\end{aligned}$$

$$+ \quad \left\{ d_H + \frac{d_{C_h}\left[b_H + b_{C_u} c_H\right]}{1 - c_{C_h} b_{C_u}} + \frac{d_{C_u}\left[c_H + c_{C_h} b_H\right]}{1 - c_{C_h} b_{C_u}} \right\} \times \frac{\partial H}{\partial A_0}. \quad (37)$$

Equations (33) and (37) contain many higher-order terms and are intractable to work with. For this reason, we make the simplifying assumption that first-order terms dominate higher-order terms. In other words, that terms such as for example $b_{C_u}(t)c_q(t)$ (which captures the indirect effect of wealth on healthy consumption through the effect that wealth has on unhealthy consumption and unhealthy consumption in turn has on healthy consumption) are smaller than $b_q(t)$ (which captures the direct effect of wealth on healthy consumption). It turns out that this assumption is mathematically equivalent to assuming the utility function and the health deterioration function are additively separable. Thus we effectively assume that all cross-derivatives are zero, such that the marginal utility of consumption does not depend on health and vice versa, and that the effect of consumption on health deterioration does not depend on the health stock and vice versa.

The comparative dynamic effect of initial wealth on healthy and unhealthy consumption is under this assumption approximated by equations (13) and (14), respectively.

The equation for the change in the relative value of health reduces to

$$\frac{\partial}{\partial t}\frac{\partial q_{h/a}}{\partial A_0} \quad \approx \quad a_q(t)\frac{\partial q_A(0)}{\partial A_0} + a_{h/a}(t)\frac{\partial q_{h/a}}{\partial A_0} + a_H(t)\frac{\partial H}{\partial A_0}, \quad (38)$$

where $a_q(t) = q_A(0)^{-2}\partial U/\partial H\, e^{-(\beta-\delta)t} > 0$. The sign of $a_{h/a}(t) = \partial d/\partial H + \delta$ is plausibly positive. Dalgaard and Strulik (2014) argue that the arrival of new health problems increases with the number of problems a person already has, or, in other words, that the rate of aging $d(t)/H(t)$ is faster when in bad health. As long as the elasticity of the aging rate $d(t)$ with respect to health $H(t)$ is smaller than 1, the rate of aging is slower for those in better health, and $\partial d/\partial H$ would be positive. Additionally we assume $a_H(t) = q_{h/a}(t)\partial^2 d/\partial H^2 - 1/q_A(0)\partial^2 U/\partial H^2 e^{(\beta-\delta)t} - \partial^2 Y/\partial H^2 > 0$, noting that the second and third terms are positive due to the assumption of diminishing returns to health, while the sign of the first term is undetermined. The expression for the change in health is

$$\frac{\partial}{\partial t}\frac{\partial H}{\partial A_0} \quad \approx \quad d_{h/a}(t) \times \frac{\partial q_{h/a}}{\partial A_0} + d_H(t) \times \frac{\partial H}{\partial A_0}, \quad (39)$$

where $d_{h/a}(t) = \alpha/(1-\alpha)[\alpha\mu_I(t)/p_I(t)]^{(\alpha/(1-\alpha)}q_{h/a}(t)^{(2\alpha-1)/(1-\alpha)} > 0$, and $d_H(t) = -\partial d/\partial H < 0$. We find these assumptions most plausible but other scenarios are possible as well and we discuss these below.

Using the comparative dynamic results in (38) and (39), we are ready to predict the sign of $\partial q_{h/a}(t)/\partial A_0$ and $\partial H(t)/\partial A_0$. Figure 2 shows the phase diagram for the motion paths of the variation in the relative value of health with respect to variation in initial wealth $\partial q_{h/a}/\partial A_0$ (y-axis) versus the variation in the health stock with respect to initial wealth $\partial H/\partial A_0$ (x-axis). Thus the phase diagram shows the difference between perturbed paths and the unperturbed path. The boundaries between regimes, the so called null-clines, are indicated by the thick lines in the Figure and are obtained by setting the derivatives $(\partial/\partial t)\left(\partial q_{h/a}/\partial A_0\right)$ and $(\partial/\partial t)(\partial H/\partial A_0)$ to zero, respectively. The two null clines define four distinct dynamic regions. Since we know the signs of all coefficients in (38) and (39), and in particular $\partial q_A(0)/\partial A_0 < 0$, we can predict the direction of motion $(\partial/\partial t)\left(\partial q_{h/a}/\partial A_0\right)$ and $(\partial/\partial t)(\partial H/\partial A_0)$ in the phase diagram. Note that the four dynamic regions do not correspond to the quadrants. The block arrows indicate the direction of motion in each of the four dynamic regions and the grey dotted lines provide example trajectories. While the null clines are functions of age and shift over time the nature of the diagram is essentially unchanged, for the assumed signs of $a_{h/a}(t)$, $a_H(t)$ and $d_H(t)$. I.e. for these assumed signs there are always four dynamic regions, the $(\partial/\partial t)\left(\partial q_{h/a}/\partial A_0\right)$ null-cline is always downward sloping and intersects the x-axis for a positive value of $\partial H/\partial A_0$, and the $(\partial/\partial t)(\partial H/\partial A_0)$ null cline is always upward sloping and intersects the origin.

Since both initial health $H(0) = H_0$ and end-of-life health $H(T) = H_{min}$ are fixed, it follows that $\partial H(0)/\partial A_0 = \partial H(T)/\partial A_0 = 0$. Thus, in the phase diagram all admissible paths should begin and end at the vertical axis.

Consider a path that starts at the vertical axis, but below the horizontal axis (corresponding to $\partial q_{h/a}(0)/\partial A_0 < 0$). Such a path will move toward the South-West, and stay there indefinitely, as indicated by the dotted line drawn for illustrative purposes. Hence, we can rule out solutions associated with $\partial q_{h/a}(0)/\partial A_0 < 0$. Similarly, paths starting at the vertical axis, but above the $(\partial/\partial t)\left(\partial q_{h/a}/\partial A_0\right)$ null-cline, will move toward the North-East and stay there indefinitely, never returning to the vertical axis in finite time, as is shown by the example trajectory.

Now consider a path starting at the vertical axis, between the horizontal axis and the $(\partial/\partial t)\left(\partial q_{h/a}/\partial A_0\right) = 0$ null-cline. This path is associated with $\partial q_{h/a}(0)/\partial A_0 > 0$, and could return to the vertical axis in finite time if it crosses the horizontal axis and enters quadrant IV at some point over the lifecycle. This path satisfies all conditions, and an example trajectory is shown for illustrative purposes.

From this analysis we conclude that $\partial q_{h/a}(t)/\partial A_0 \geq 0$, at least initially, and $\partial H(t)/\partial A_0 \geq 0 \quad \forall t$.

Hence, higher initial wealth boosts the relative value of health initially, leading to a higher health stock throughout life, but eventually the relative value of health falls below the unperturbed (original) path after some age. The prediction that the relative value of health falls below the original path after some age is due to the assumption that life span T is fixed. In such a model, the relative value of health (and hence health investment) cannot be higher throughout life, as this would be associated with a higher health stock at every age, violating the end condition that $H(T) = H_{\min}$. The same result is obtained if instead $\partial d/\partial H < 0$ and large, so that $a_{h/a}(t) < 0$ and $d_H(t) > 0$. Only when $\partial d/\partial H < 0$ but $|\partial d/\partial H| < \delta$, so that $a_{h/a}(t) > 0$ and $d_H(t) > 0$ do we find that $\partial q_{h/a}(t)/\partial A_0 \leq 0$, at least initially, and $\partial H(t)/\partial A_0 \leq 0 \quad \forall t$. Thus greater initial wealth would reduce investment in health in the short-run and lead to worse health throughout the lifecycle. Since this prediction runs contrary to the observed positive association of wealth and health, we rule out this scenario.

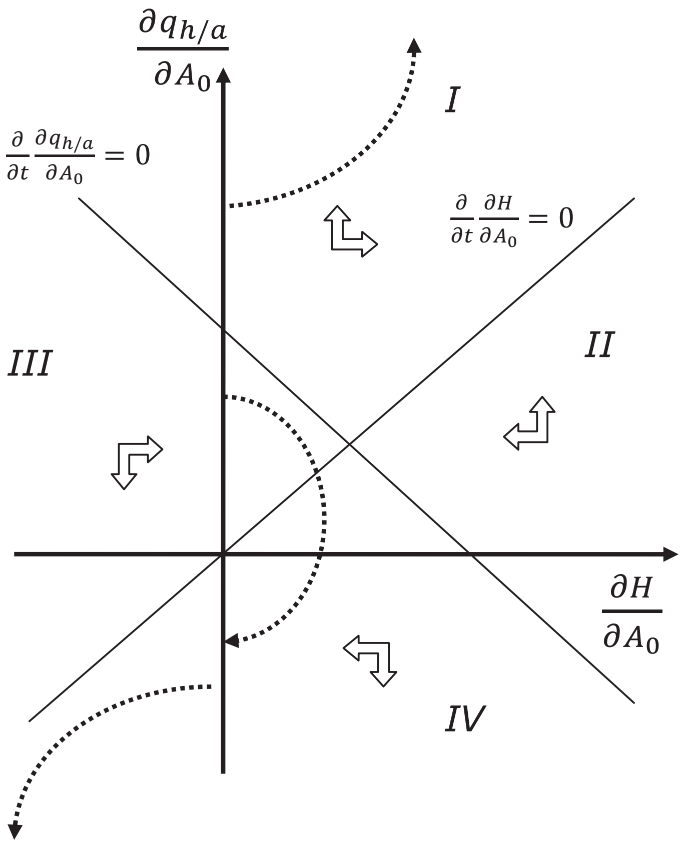

Figure 2: *Phase diagram.*

C Tables

Table 8: Variables in the HRS

Variable	Unit
Dependent variables	
Food Expenditures ($)	Continuous, in 2005 US dollars, per week
Smoking	Binary: 0 if not smoking, 1 if smoking currently
Number of Cigarettes	Continuous, per day
Drinking	Binary: 0 if does not drink, 1 if drinks
Number of Drinks	Continuous, weekly
Heavy Drinking	Binary: 0 if less than 3 drinks on an occasion, 1 if more
Physical Activity	5 categories: – 1) Never, 2), 1 to 3 times per month, 3) Once per week, 4) More than once per week, 5) Every day
Independent variables	
Household Wealth ($)	Continuous, in 2005 US dollars
Inheritance	Binary: 0 if no inheritance, 1 if received inheritance in past two years
Amount Inherited ($)	Continuous, in US dollars
Big Inheritance	Binary: 0 if Amount Inherited $<$ $ 10,000, 1 if $\geq$ $ 10,000
Control variables	
Household Income ($)	Continuous, annual gross, 2005 US dollars
Age	Continuous, in years
Sex	Binary: 0 if female, 1 if male
Race	3 categories – 1) White/Caucasian, 2) Black/African American, 3) Other
Census Region	5 categories – 1) Northeast, 2) Midwest, 3) South, 4) West, 5) Other
Household Size	Continuous
Number of Children	Continuous
Years of Education	Continuous, in years of schooling
Health Status	5 categories – 1) Excellent, 2) Very Good, 3) Good, 4) Fair, 5) Poor
Marital Status	8 categories – 1) Married, 2) Married, spouse absent, 3) Partnered, 4) Separated, 5) Divorced, 6) Separated/Divorced, 7) Widow, 8) Never married
Employment Status	Binary: 0 if not working for pay, 1 if working for pay
Ever Smoked	Binary: 0 if never smoked, 1 if ever smoked
Health Insurance	Binary: 0 if no health insurance, 1 if health insurance
Mother Died	Binary: 1 if mother died in the wave, 0 if not
Father Died	Binary: 1 if father died in the wave, 0 if not
Mother in Law Died	Binary: 1 if mother in law died in the wave, 0 if not
Father in Law Died	Binary: 1 if father in law died in the wave, 0 if not
Widowed	Binary: 1 if widowed in the wave, 0 if not

Table 9: Variables in the BHPS

Variable	Unit
Dependent variables	
Food Expenditures	12 categories – 1 ($<$ £ 10), 2 (£ 10 - 19), 3 (£ 20 - 29), 4 (£ 30 - 39), 5 (£ 40 - 49), 6 (£ 50 - 59)
(£ per month)	7 (£ 60 - 79), 8 (£ 80 - 99), 9 (£ 100 - 119), 10 (£ 120 - 139), 11 (£ 140 - 159), 12 ($\geq$ £ 160); in 2005 British pounds
Smoking	Binary: 0 if not smoking, 1 if smoking currently
Number of Cigarettes	Continuous, per day
Drinking Out	5 categories – 1 (Never, almost never), 2 (Once a year or less), 3 (Several times a year),
	4 (At least once a month), 5 (At least once a week)
Sports	5 categories – 1 (Never, almost never), 2 (Once a year or less), 3 (Several times a year),
	4 (At least once a month), 5 (At least once a week)
Independent variables	
Household Wealth (£)	Continuous – only available in 2000, 2005; in 2005 British pounds
Lottery Winnings	Binary: 1 if won the lottery, 0 if not
Amount Lottery Won (£)	Continuous, in 2005 British pounds
Big Win	Binary: 1 if Prize Won bigger than 500 British pounds, 0 if not
Control variables	
Household Income (£)	Continuous, annual gross, in 2005 British pounds
Age	Continuous, years
Sex	Binary: 0 if female, 1 if male
Region	19 regions – 1 (Inner London), 2 (Outer London), 3 (Rest of South East), 4 (South West), 5 (East Anglia)
	6 (East Midlands), 7 (West Midlands Conurbation), 8 (Rest of West Midlands), 9 (Greater Manchester)
	10 (Merseyside), 11 (Rest of North West), 12 (South Yorkshire), 13 (West Yorkshire)
	14 (Rest of Yorks & Humberside), 15 (Tyne & Wear), 16 (Rest of North), 17 (Wales), 18 (Scotland), and 19 (Northern Ireland)
Household Size	Continuous
Number of Children	Continuous
Level of Education	13 categories – 1 (Higher Degree), 2 (First Degree), 3 (Teaching Qualification), 4 (Other Higher Qualification),
	5 (Nursing Qualification), 6 (GCE A Levels), 7 (GCE O Levels or Equivalent),
	8 (Commercial Qualification, No O Levels), 9 (CSE Grade 2-5, Scottish Grade 4-5),
	10 (Apprenticeship), 11 (Other Qualification), 12 (No Qualification), 13 (Still At School, no Qualification)
Health Status	5 categories – 1 (Excellent), 2 (Good), 3 (Fair), 4 (Poor), 5 (Very Poor)
Marital Status	7 categories – 1 (Married), 2 (Separated), 3 (Divorced), 4 (Widowed), 5 (Never married), 6 (Partnership), 7 (Dissolved partnership)
Employment Status	10 categories – 1 (Self-employed), 2 (Employed), 3 (Unemployed), 4 (Retired), 5 (Maternity leave),
	6 (Family care), 7 (Full-time student), 8 (Disabled), 9 (Government training scheme), 10 (Other)

Table 10: Results for "Inheritance" – HRS

Outcome	OLS 1	FE 1	OLS 2	FE 2	OLS 3	FE 3
Log Food Expenditures	0.2438***	0.0439*	0.0672***	0.0496*	0.0661***	0.0487*
	(0.0244)	(0.0241)	(0.0252)	(0.0256)	(0.0251)	(0.0256)
Smoking	−0.0097	0.0110***	−0.0041	0.0096***	−0.0041	0.0095***
	(0.0063)	(0.0028)	(0.0060)	(0.0029)	(0.0060)	(0.0029)
- Among Smokers	0.0123	0.0314**	0.0141	0.0243	0.0136	0.0232
	(0.0149)	(0.0155)	(0.0155)	(0.0156)	(0.0155)	(0.0157)
- Among Non-Smokers	−0.0005	0.0031**	−0.0012	0.0021	−0.0011	0.0020
	(0.0020)	(0.0015)	(0.0021)	(0.0016)	(0.0021)	(0.0016)
Drinking	0.1584***	0.0146***	0.0519***	0.0137***	0.0514***	0.0137***
	(0.0092)	(0.0051)	(0.0087)	(0.0052)	(0.0087)	(0.0052)
Log Number of Drinks	0.1255***	0.0041	0.0594**	0.0106	0.0596**	0.0107
	(0.0259)	(0.0145)	(0.0258)	(0.0148)	(0.0257)	(0.0148)
Heavy Drinking	−0.0052	0.0042	0.0006	0.0054	0.0013	0.0054
	(0.0074)	(0.0057)	(0.0074)	(0.0058)	(0.0073)	(0.0058)
Physical Activity	0.1995***	0.0104	−0.0381**	0.0011	−0.0370*	0.0016
	(0.0201)	(0.0189)	(0.0194)	(0.0191)	(0.0194)	(0.0191)

* p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01

Notes: Author's calculations on the basis of the 1992-2010 HRS. "OLS 1" is an OLS regression of the relevant outcome on the binary inheritance indicator without control variables. "FE 1" is a fixed effects regression without control variables. "OLS 2" and "FE 2" add control variables, but excludes the potentially endogenous control variables: employment, marriage and number of children. "OLS 3" and "FE 3" include the full list of control variables, where "FE 3" presents the final results that are used in the paper.

Table 11: Results for "Log Amount Inherited" – HRS

Outcome	OLS 1	FE 1	OLS 2	FE 2	OLS 3	FE 3
Log Food Expenditures	0.0237***	0.0047**	0.0073***	0.0052**	0.0072***	0.0051**
	(0.0023)	(0.0023)	(0.0024)	(0.0025)	(0.0024)	(0.0025)
Smoking	−0.0012**	0.0009***	−0.0005	0.0009***	−0.0005	0.0009***
	(0.0006)	(0.0003)	(0.0005)	(0.0003)	(0.0005)	(0.0003)
- Among Smokers	0.0006	0.0025*	0.0008	0.0021	0.0008	0.0021
	(0.0014)	(0.0015)	(0.0015)	(0.0015)	(0.0015)	(0.0015)
- Among Non-Smokers	−0.0000	0.0003**	−0.0001	0.0002	−0.0001	0.0002
	(0.0002)	(0.0001)	(0.0002)	(0.0001)	(0.0002)	(0.0001)
Drinking	0.0149***	0.0012***	0.0049***	0.0012**	0.0049***	0.0012**
	(0.0009)	(0.0005)	(0.0008)	(0.0005)	(0.0008)	(0.0005)
Log Number of Drinks	0.0119***	−0.0000	0.0056**	0.0006	0.0056**	0.0006
	(0.0024)	(0.0013)	(0.0023)	(0.0014)	(0.0023)	(0.0013)
Heavy Drinking	−0.0005	0.0004	0.0001	0.0006	0.0002	0.0006
	(0.0007)	(0.0005)	(0.0007)	(0.0005)	(0.0007)	(0.0005)
Physical Activity	0.0179***	0.0005	−0.0038**	−0.0004	−0.0037**	−0.0003
	(0.0018)	(0.0017)	(0.0018)	(0.0017)	(0.0018)	(0.0017)

* p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01

Notes: Author's calculations on the basis of the 1992-2010 HRS. "OLS 1" is an OLS regression of the relevant outcome on the logarithm of the amount inherited without control variables. "FE 1" is a fixed effects regression without control variables. "OLS 2" and "FE 2" adds control variables, but excludes the potentially endogenous control variables employment, marriage and number of children. "OLS 3" and "FE 3" include the full list of control variables, where "FE 3" presents the final results that are used in the paper.

Table 12: Results for “Big Lottery Won” – BHPS

Outcome	OLS 1	FE 1	OLS 2	FE 2	OLS 3	FE 3
Log Food Expenditures	0.3305***	0.1136***	0.2961***	0.0958**	0.2678***	0.0959**
	(0.0620)	(0.0387)	(0.0502)	(0.0388)	(0.0493)	(0.0388)
Smoking	0.0513**	−0.0097	0.0455**	−0.0045	0.0364	−0.0047
	(0.0239)	(0.0090)	(0.0227)	(0.0091)	(0.0222)	(0.0091)
- Among Smokers	0.0091	−0.0056	0.0100	0.0115	0.0077	0.0115
	(0.0197)	(0.0238)	(0.0198)	(0.0238)	(0.0196)	(0.0237)
- Among Non-Smokers	0.0076	−0.0010	0.0086	−0.0015	0.0083	−0.0014
	(0.0086)	(0.0052)	(0.0086)	(0.0053)	(0.0085)	(0.0053)
Log Number of Cigarettes	0.1180*	−0.0019	0.1036	0.0471	0.0914	0.0480
	(0.0703)	(0.0613)	(0.0673)	(0.0605)	(0.0662)	(0.0601)
Drinking Out	0.2095**	0.0673	0.2404***	0.1080*	0.2486***	0.1076*
	(0.0822)	(0.0569)	(0.0735)	(0.0569)	(0.0725)	(0.0566)
Sports	0.0931	−0.0214	0.0641	−0.0391	0.0662	−0.0424
	(0.0947)	(0.0842)	(0.0937)	(0.0843)	(0.0935)	(0.0842)

* p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01

Notes: Author’s calculations on the basis of the 1997-2008 BHPS. “OLS 1” is an OLS regression of the relevant outcome on the binary Big Win (i.e. lottery amounts won above 500 British Pounds) indicator without control variables. “FE 1” is a fixed effects regression without control variables. “OLS 2” and “FE 2” adds control variables, but excludes the potentially endogenous control variables employment, marriage and number of children. “OLS 3” and “FE 3” include the full list of control variables, where “FE presents the final results that are used in the paper.

Table 13: Results for "Log Amount Lottery Won" – BHPS

Outcome	OLS 1	FE 1	OLS 2	FE 2	OLS 3	FE 3
Log Food Expenditures	0.0551***	0.0055*	0.0344***	0.0073**	0.0322***	0.0069**
	(0.0044)	(0.0030)	(0.0038)	(0.0030)	(0.0037)	(0.0030)
Smoking	0.0043**	0.0014**	0.0023	0.0002	0.0026	0.0002
	(0.0017)	(0.0006)	(0.0017)	(0.0006)	(0.0016)	(0.0006)
- Among Smokers	0.0013	0.0021	0.0013	−0.0005	0.0016	−0.0005
	(0.0013)	(0.0015)	(0.0013)	(0.0015)	(0.0013)	(0.0015)
- Among Non-Smokers	−0.0002	−0.0003	−0.0002	−0.0003	−0.0002	−0.0003
	(0.0005)	(0.0004)	(0.0005)	(0.0004)	(0.0005)	(0.0004)
Log Number of Cigarettes	0.0120**	0.0060	0.0104**	−0.0015	0.0122**	−0.0014
	(0.0052)	(0.0043)	(0.0050)	(0.0042)	(0.0050)	(0.0042)
Drinking Out	0.0963***	0.0225***	0.0529***	0.0146***	0.0501***	0.0145***
	(0.0058)	(0.0036)	(0.0050)	(0.0036)	(0.0049)	(0.0036)
Sports	0.0316***	0.0116**	0.0238***	0.0110**	0.0236***	0.0114**
	(0.0061)	(0.0054)	(0.0059)	(0.0054)	(0.0058)	(0.0054)

* p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01

Notes: Author's calculations on the basis of the 1997-2008 BHPS. "OLS 1" is an OLS regression of the relevant outcome on the logarithm of the amount won in the lottery without control variables. "FE 1" is a fixed effects regression without control variables. "OLS 2" and "FE 2" adds control variables, but excludes the potentially endogenous control variables: employment, marriage and number of children. "OLS 3" and "FE 3" include the full list of control variables, where "FE 3" presents the final results that are used in the paper.

Table 14: Correlation of lagged time-varying factors with receipt of inheritances

Variable	FE Inheritance	FE Log Amount Inherited
Age	0.0087***	0.1018***
	(0.0026)	(0.0284)
Age-squared	−0.0000***	−0.0005***
	(0.0000)	(0.0001)
Log Wealth (t-1)	−0.0007*	−0.0066
	(0.0004)	(0.0044)
Region North East (t-1)	0.0348	0.4866
	(0.0464)	(0.5567)
Region West (t-1)	−0.0158	−0.1245
	(0.0333)	(0.3859)
Household members (t-1)	−0.0006	−0.0048
	(0.0011)	(0.0119)
Number of children (t-1)	−0.0013	−0.0139
	(0.0011)	(0.0118)
Log Income (t-1)	−0.0013*	−0.0192**
	(0.0008)	(0.0087)
Health Excellent (t-1)	0.0033	0.0410
	(0.0036)	(0.0384)
Health Very Good (t-1)	0.0045	0.0534*
	(0.0029)	(0.0312)
Health Good (t-1)	0.0055**	0.0652**
	(0.0026)	(0.0277)
Health Fair (t-1)	0.0026	0.0320
	(0.0024)	(0.0252)
Partnered (t-1)	0.0127	0.1624*
	(0.0083)	(0.0944)
Separated (t-1)	0.0141**	0.1314*
	(0.0067)	(0.0702)
Divorced (t-1)	−0.0043	−0.0556
	(0.0054)	(0.0570)
Widowed (t-1)	−0.0022	−0.0358
	(0.0038)	(0.0413)
Never Married (t-1)	−0.0043	−0.0678
	(0.0099)	(0.1099)
Employment status (t-1)	0.0008	0.0115
	(0.0023)	(0.0248)
Health Insurance (t-1)	−0.0016	−0.0180
	(0.0023)	(0.0244)
Constant	−0.3273	−4.0694
	(121.3858)	(677.7819)

* p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01

Notes: Author's calculations on the basis of the 1992-2010 HRS. "FE Inheritance" is a fixed effects model with "Inheritance" as the dependent variable, and "FE Log Amount Inherited" is a fixed effects model with the logarithm of the amount inherited as dependent variable.

Table 15: Correlation of lagged time-varying factors with lottery winning

Variable	FE Lottery	FE Log Amount Won
Log Income (t-1)	0.0018	0.0287
	(0.0011)	(0.0210)
Age	0.0014	0.0767
	(0.0027)	(0.0540)
Age-squared	−0.0000*	−0.0004**
	(0.0000)	(0.0002)
Region South (t-1)	0.0115	−1.1634*
	(0.0829)	(0.6750)
Region East (t-1)	0.0119	−2.7795*
	(0.0355)	(1.4781)
Region West (t-1)	−0.0081	0.7127
	(0.0377)	(1.0011)
Region North (t-1)	0.0270	−0.3255
	(0.0580)	(0.7568)
Household size (t-1)	−0.0040***	0.0267
	(0.0015)	(0.0280)
Number of children (t-1)	0.0026	−0.0032
	(0.0024)	(0.0400)
Health Excellent (t-1)	0.0059	−0.1240
	(0.0064)	(0.1131)
Health Good (t-1)	0.0027	−0.0887
	(0.0062)	(0.1091)
Health Fair (t-1)	0.0048	0.0135
	(0.0061)	(0.1070)
Health Poor (t-1)	−0.0032	0.0221
	(0.0060)	(0.1086)
Self-Employed (t-1)	0.0107*	−0.0334
	(0.0059)	(0.1133)
Disabled (t-1)	0.0010	0.0225
	(0.0062)	(0.1399)
Unemployed (t-1)	0.0007	0.0096
	(0.0053)	(0.1100)
Retired (t-1)	0.0060	−0.0723
	(0.0053)	(0.1019)
Employed (t-1)	0.0088**	0.0117
	(0.0035)	(0.0772)
Married (t-1)	0.0027	−0.2811**
	(0.0068)	(0.1102)
Separated (t-1)	0.0057	−0.2095
	(0.0087)	(0.1660)
Widowed (t-1)	0.0078	0.1277
	(0.0109)	(0.1995)
Constant	0.1557	2.0860
	(0.1117)	(2.7698)

* p-value < 0.1, ** p-value < 0.05, *** p-value < 0.01

Notes: Author's calculations on the basis of the 1997-2008 BHPS. "FE Lottery" is a fixed effects model with "Lottery Won" as dependent variable, and "FE Log Amount Won" is a fixed effects model with the logarithm of the amount won as dependent variable.